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STATEMENT OF WORK

Constructive Occlusion-based Light Distribution Component for a Low-Profile Linear Fluorescent Fixture

February 9, 2000

1.1 Statement of Work

This Statement of Work (SOW) describes the technical tasks that will be performed to develop an optical design for the Constructive Occlusion-based Light Distribution Component (LDC) to be integrated into a Finelite Low-Profile Linear Fluorescent (LPLF) Light Fixture. Because of the different downlight options desired by Finelite, the project requires three separate optical designs. The development process is the same for each design and there are economies of scale. AOT will complete the design for the 50% downlight option first, using the results to modify the design to complete the 30% downlight option. Based upon these results, we will complete the 10% downlight option.

The SOW is divided into two phases, with Phase I representing the AOT optical design and engineering feasibility effort and the second phase being a Time and Material effort to support Finelite's Mechanical and Industrial Engineering design as they integrate the optical design into the final product.

1.1.1 Phase I. Optical Design

The design goal of the project will be to develop a Constructive Occlusion-based LPLF optical component that will be integrated by Finelite into a low-profile fluorescent light fixture.

1.1.1.1 Task 1: Complete Optical Design.

Task 1. Develop Low-Profile Linear Fluorescent Fixture (LPLF) Optical Component Specification.

AOT will develop an initial performance and packaging specification for the LPLF optical component (e.g., uniformity, light intensity, display size, package depth, etc.).

This proposed specification will be reviewed with Finelite during a Specification IPR. Any outstanding issues regarding performance and packaging will be addressed during the IPR prior to proceeding with the design effort. Finelite will have the primary responsibility for the selection of the light source and ballast to be used for the development of the optical design. At the conclusion of this task, an LPLF optical component Performance and Packaging Specification will be prepared by AOT and approved by Finelite. The draft PPI specification is included as Appendix A.

Task 2. Develop Initial LPLF Optical Component Design.

Using the PPI document prepared in Task 1, AOT will determine the initial optical design parameters, including physical dimensions of the LPLF optical component and component materials requirements. Using its proprietary design process and computer models, AOT will develop an initial conceptual LPLF optical component design and create computer models to analyze the ability of the candidate design to meet product specifications. This design will be developed using OptiCad. Once a preliminary solution has been developed, the design will be reviewed by AOT's and Finelite's Mechanical Engineering staff to assess manufacturing and cost issues associated with the design. This process may require several iterations to obtain a feasible design. The outputs of this task are the baseline optical design parameters of the new light distribution component. This task will be repeated for each of the proposed optical designs based upon downlight requirement.

Task 3. Optimize the LPLF Optical Component Design.

Using the baseline optical design parameters developed in Task 2, AOT will create a Photopia model to optimize the optical design. Photopia requires that detailed 3-D surface drawings be prepared using AutoCad or equivalent CAD package. AOT will make design modifications to meet project requirements or to optimize performance in accordance with the stated objectives of the project. AOT and Finelite's mechanical engineering staff will evaluate the optical design for mechanical efficacy. Throughout this task, AOT will coordinate the efforts of its design and mechanical engineering staff with Finelite's project personnel to ensure that manufacturing and cost objectives are appropriately considered. This task will be repeated for each of the proposed optical designs based upon downlight requirement.

Task 4. Fabricate Optical Prototype.

AOT will fabricate a working optical prototype of the LDC to validate the performance of the optical design. This prototype is intended only to validate the performance of the optical design and will not necessarily include desired mechanical design features. This task will be repeated for each of the proposed optical designs based upon downlight requirement.

Task 5. Prepare Optical Design Specification.

Upon completion of the design effort, AOT will prepare a detailed design specification, including dimensioned drawings, that will be to be used by Finelite to complete the mechanical and industrial design of the LDC. This specification will be reviewed with Finelite management during a Program Review. This task will be repeated for each of the proposed optical designs based upon downlight requirement.

1.1.1.2 Phase I Deliverables:

a. Performance and Packaging Specification
b. Model Results
c. Optical prototype
d. Optical Design Specification and Drawings

1.1.2 Phase II. Mechanical Engineering and Industrial Design Technical Support

Mechanical engineering and Industrial Design of the optical component and the complete low-profile fluorescent light fixture is the responsibility of Finelite. As required, AOT will assist Finelite's engineering staff in the engineering and industrial design of the LPLF optical component that will be integrated by Finelite into an engineering prototype of the Low-Profile Linear Fluorescent fixture. This phase begins upon delivery of the completed optical Design Specification. It includes verification of the optical performance of the LPLF optical component in response to design changes made by Finelite's Industrial and Mechanical Engineers. This effort will be performed on a Time and Materials basis. Upon completion of the engineering prototype, AOT will assist in the testing and qualification of the Low-Profile Linear Fluorescent fixture, assessing its compliance with all product specifications. AOT will also assist in any troubleshooting of the prototype design, analyze any proposed design modifications, and assist Finelite, as needed, to implement design changes.

Questions regarding this Statement of Work should be addressed to Mr. Jack C. Rains, Jr., General Manager of AOT at (703) 676-8651. The employees of AOT appreciate the opportunity to propose this new product development project to Finelite.

Constructive Occlusion-based Light Distribution Component for a Low-Profile Linear Fluorescent Fixture

Performance, Packaging, and Installation Specification (DRAFT)

February 9, 2000

Performance Specification:

1. Fixture must comply with IES RP-1 requirements with the caveat that it may not be possible to meet all luminance constraints identified in Table 7-1. However, AOT will make every reasonable effort to meet these constraints.

2. Ceiling plane Max-to-Min uniformity not to exceed 4:1. Photometric measurements will assume 80% ceiling reflectivity, 50% wall reflectivity, and 20% floor reflectivity. Photometrics will be based upon 48' x 48' room and ceiling height of 8.5'.

3. Minimum workplane illuminance design goal of 35 fc using two lamps. AOT will construct a lamp matrix indicating the number and type of lamps that will be required to satisfy this requirement.

4. Fixture efficiency sufficient to satisfy workplane illuminance requirement with a design goal of 75%.

5. Variable downlight options are 50%, 30%, and 10%.

6. Symetrical light output with asymetrical snap-in option limiting light throw to one direction. The asymetrical option may have reduced efficiency.

Packaging Specification:

1. Fixture will be designed to house one or two T5 standard/HO or T8 standard/HO fluorescent lamps or one F40/F50 BIAX lamp. The optical package will be designed to accommodate the largest lamp option.

2. Individual fixture lengths may be 3' or 4', the specific length will be selected during the optical design process.

3. Fixture housing will not exceed 2.25" in depth or 9" in width with a design goal of 2" in depth and 8" in width.

4. Fixture housing to contain standard slimline type ballast (approx 1.5"x1.5"x15")

5. Fixture to comply with all CSA and UL codes.

6. Manufacturing cost goal not to exceed $30/ft CDN.

Installation Specification:

1. Maximum of 10" mounting height from ceiling plane to underside of the fixture.

2. Fixtures to be mounted in continuous rows on minimum of 10' centers with a design goal of 12' centers.